UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/944,317	08/31/2001	Nikos Paragios	2000P07873US01	2148

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EXAMINER
LAVIN, CHRISTOPHER L

ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 03/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/944,317	PARAGIOS ET AL.
	Examiner	Art Unit
	Christopher L. Lavin	2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>22 December 2005</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-15</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-15</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>31 August 2001</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   Applicant is advised that should claims 8 and 12 be found allowable, claims 8

and 12 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof.

When two claims in an application are duplicates or else are so close in content that

they both cover the same thing, despite a slight difference in wording, it is proper after

allowing one claim to object to the other as being a substantial duplicate of the allowed

claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3.   Claims 1, 3, 5, 8, 10, 12, and 15 are rejected under 35 U.S.C. 102(b) as being

anticipated by Velastin et al ("Automated measurement of crowd density and motion

using image processing", Road Traffic Monitoring and Control, 1994., Seventh

International Conference on, 26-28 Apr 1994 Page(s):127 – 132).

In regards to claim 1, A method of video analysis comprising the steps of:

estimating a background reference frame for representing a background (p. 128, section

entitled Background Removal); estimating geometric parameters for representing a size

changes of objects as the objects are moved at various depths in a given frame, the

geometric parameters comprising a weighting for each pixel in the given frame (p. 129,

section entitled Geometric Correction: Velastin performs a geometric correction to the image. This correction makes all of the people appear to the size. By doing this Velastin is "weighting" all of the pixels, some pixels are stretched while others are reduced. Please note that the examiner has provided the teaching of how this operation is performed in the additional references section at the bottom of this action.); obtaining a change detection map for distinguishing the background from the objects in the given frame (p. 128 sections Thinned Edges and Background Removal); and determining a measure of congestion of the given frame by combining the change detection map with the geometric (p. 128 Crowd Density, figure 3).

In regards to claim 3, The method of claim 1, wherein said scale variation comprises variation in the object's width and height as a function of said object's position in the given frame (p. 129, section entitled Geometric Correction: The height and width of the objects are modified to make the people appear the same size throughout the image.).

In regards to claim 5, The method of claim 1, wherein the measure of congestion is a prolonged temporal event wherein a given percentage of a platform area is crowded with people for a given period of time (p. 128 Crowd Density and Thinned Edges).

In regards to claims 8, 10, and 12, claims 8, 10, and 12are rejected for the same reasons as claims 1, 3, and 5. The argument analogous to that presented above for claims 1, 3, and 5 is applicable to claims 8, 10, and 12.

In regards to claim 15, claim 15 is rejected for the same reasons as claim 5. The argument analogous to that presented above for claim 5 is applicable to claim 15.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5.   The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

    1.   Determining the scope and contents of the prior art.
    2.   Ascertaining the differences between the prior art and the claims at issue.
    3.   Resolving the level of ordinary skill in the pertinent art.
    4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

6.   This application currently names joint inventors. In considering patentability of

the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g)

prior art under 35 U.S.C. 103(a).

7.   Claims 4, 7, 11 and 14 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Velastin in view of Karmann (5,034,986).

In regards to claims 4 and 11, Velastin discloses a static background image. However it is well known in the art as shown by Karmann (col. 5, lines 22 – 51; col. 6, lines 56 – 60: The background reference frame is modified based on the background image which is calculated from the object mask, i.e., the change detection map.) that a dynamic background map can be used which is updated using the change detection map.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use a dynamic background map (as taught by Karmann) in the method disclosed by Velastin. As Karmann teaches (col. 3, lines 57 – 58) a dynamic background map allows for gradual brightness and contrast changes. This would allow Velastin to be used in more situations, such as outdoors thus increasing its utility..

In regards to claims 7 and 14, The method of claim 4, wherein static pixels of the background reference frame are updated (Karmann: col. 5, lines 22 – 51: Every pixel of the background is updated, which includes the static pixels).

8.   Claims 2, 6, 9, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Velastin in view of Ostendorf et al ("HMM topology design using maximum likelihood successive state splitting," Computer Speech & Language, vol. 11, no 1, pp. 17 – 41, 1997) and Karmann.

In regards to claims 2 and 9, Velastin discloses a static background image. However it is well known in the art as shown by Karmann (col. 5, lines 22 – 51; col. 6, lines 56 – 60: The background reference frame is modified based on the background image which is calculated from the object mask, i.e., the change detection map.) that a

dynamic background map can be used which is updated using the change detection map.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use a dynamic background map (as taught by Karmann) in the method disclosed by Velastin. As Karmann teaches (col. 3, lines 57 – 58) a dynamic background map allows for gradual brightness and contrast changes. This would allow Velastin to be used in more situations, such as outdoors thus increasing its utility.

With the addition of a dynamic background map Velastin (as modified by Karmann) has everything in common with claim 2 except for using Hidden Markov Model with successive state splitting, which is what is claimed in claim 2.

Ostendorf in the first full paragraph on page 19 discloses the use of a Hidden Markov Model (HMM) with Successive State Splitting (SSS) which starts with a single node or state uses likelihood to determine confidence limits and where appropriate split the node into two, creating a new state.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use HMM with SSS as taught by Ostendorf to estimate the background frame of Velastin (as modified by Karmann). Markov models are among the best understood and best performing statistical tools for time-series inference, HMM are ideal for dealing with continuous data. As Velastin is now capable of tracking objects in outdoor environments which comprise of several background situations that should be taken into account: night, day, cloudy, sunny, etc.; using HMM with SSS to create a

background reference frame would be highly advantageous as this would result in more accurate background reference frames and thus more accurate tracking results.

In regards to claims 6 and 13, The method of claim 2, wherein each of said multiple nodes is assigned to a new state (Ostendorf: First full paragraph on page 19: A new state is created for each split off node.).

9.   Claims 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujioka (4,908,704) in view of Abbott (5,999,634) and Higashikubo (5,999,635).

Please note that a second rejection of claim 1 is being provided in the interest of compact prosecution. The examiner still believes that the combination called for above meets the amended claims.

In regards to claim 1, A method of video analysis comprising the steps of: estimating a background reference frame for representing a background (col. 3, lines 37 – 40); estimating geometric parameters for representing a size changes of objects as the objects are moved at various depths in a given frame, the geometric parameters comprising a weighting for each pixel in the given frame (col. 3, line 40 – col. 4, line 16; col. 4, line 65 – col. 5, line 17: "Each block can be defined for one pixel". Fujioka teaches that an alarm goes off as an object's size increases past a certain point. This is detection of size changes.); obtaining a change detection map for distinguishing the background from the objects in the given frame (col. 4, lines 17 – 32); and determining a measure of congestion of the given frame combining the change detection map with the geometric parameters to determine a measure of congestion of the given frame (col. 4, lines 33 – 64: It should be noted that everything after the word "parameters" is given no

weight as it is intended use. A method claim must be defined by positively recited steps, the to determine phrase is not a step and therefore is intended use which is not given weight.).

Fujioka does not disclose using the invention for congestion measurements, although it clearly could be used as such. Fujioka does not disclose how such a measurement could be taken or what kind of environment a congestion measurement would be taken in.

First, Abbott discloses in the tracking environment that congestion of a railway platform can be measured.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use the method disclosed by Fujioka to measure congestion on a railway platform as taught by Abbott. Both methods use a similar technique of detecting a change to track objects. Therefore including congestion measurements in Fujioka would require very little modification and add new functionality which would increase the value of the invention.

Fujioka (as modified by Abbott) does not disclose measuring congestion in the fashion described in the claims.

Higashikubo discloses in the paragraph starting at column 3, line 37 taking the ratio of the congestion area to the overall area to determine the percent of congestion at a given time. Higashikubo is a method for tracking movement.

Therefore it would have been obvious to one having ordinary skill in at the art at the time of the invention to include a congestion measurement (as taught by

Higashikubo) to the tracking method disclosed by Fujioka (as modified by Abbot).

Calculating the congestion of an image could allow Fujioka to better determine how

many objects are being tracked and better anticipate objects occluding each other.

Conclusion

10.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

11.   Papadopoulos et al, "Parallel Processing of digital images using Image

Processing", IEE 6th Int. conf. On DSP in Communications, Sept. 1991: This reference

teaches the geometric correction performed by Velastin.

12.   Cho et al, "A neural-based crowd estimation by hybrid global learning algorithm"

Systems, Man and Cybernetics, Part B, IEEE Transactions on, Volume 29, Issue 4,

Aug. 1999 Page(s):535 – 541: Another method for determining congestion on a
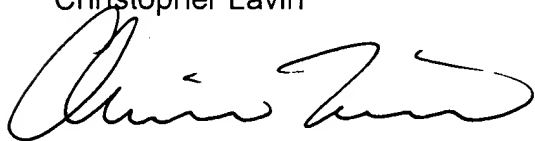
platform.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Christopher L. Lavin whose telephone number is 571-

272-7392. The examiner can normally be reached on M - F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Bhavesh M. Mehta can be reached on (571) 272-7453. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christopher Lavin

BRIAN WERNER
PRIMARY EXAMINER